

What is claimed is:

- 1 1. A flow cell for directed molecular interaction in conjunction
- 2 with analyte assays comprising:
- 3 a fluid path having one or more fluidic conduits;
- 4 an analyte detection chamber disposed along the fluid path
- 5 having at least one interior surface adapted for derivatization;
- 6 and
- 7 a directed molecular interaction bias generator, in fluidic
- 8 communication with the analyte detection chamber, adapted to
- 9 generate a bias across the chamber sufficient to move a desired
- 10 analyte into a region proximate to the interior surface adapted for
- 11 derivatization.

1 2. The flow cell of claim 1 wherein the interior surface adapted  
2 for derivatization is a surface plasmon resonance detector.

1 3. The flow cell of claim 2 wherein the surface adapted for  
2 derivatization is a surface plasmon resonance layer in optic  
3 communication with an integrally formed surface plasmon resonance  
4 sensor.

1 4. The flow cell of claim 3 wherein the bias generator is  
2 electrical.

1 5. The flow cell of claim 4 further comprising a thermister in  
2 fluidic communication with the analyte detection chamber.

1 6. The flow cell of claim 2 wherein the bias generator is magnetic.

1 7. The flow cell of claim 6 further comprising a thermister in  
2 fluidic communication with the analyte detection chamber.

1 8. A sample delivery and sensing unit for directed molecular  
2 interaction during surface plasmon resonance analysis comprising:  
3 an integrally formed surface plasmon resonance sensor having,  
4 in fixed disposition thereto, a housing transparent to a given  
5 frequency of light, a source of the given frequency of light, a  
6 mirror and a photodetector array;  
7 a surface plasmon resonance layer in optic communication with  
8 the integrally formed surface plasmon resonance sensor; and  
9 a flow cell adapted for attachment to the surface plasmon  
10 resonance layer, having a fluid path, an analyte detection chamber  
11 disposed along the fluid path and having an interior surface in  
12 fluidic communication with the surface plasmon resonance layer, and  
13 adapted for generation of a molecular interaction bias across the  
14 chamber.

1 9. The unit of claim 8 wherein the molecular interaction bias is  
2 electrical.

1 10. The unit of claim 8 wherein the molecular interaction bias is  
2 magnetic.

1 11. A sample delivery and sensing unit for directed molecular  
2 interaction during surface plasmon resonance analysis comprising:  
3 an integrally formed surface plasmon sensor having, in fixed  
4 functional geometric alignment thereto, a housing transparent to  
5 electromagnetic radiation of a given frequency range, a source of  
6 electromagnetic radiation having the given frequency range, a  
7 photodetector array disposed adjacent the surface of the housing  
8 and substantially coplanar with the source, such that radiation  
9 from the source reflects off the surface and strikes the  
10 photodetector array;  
11 a thin surface plasmon resonance layer in optic communication  
12 with an exterior surface of the integrally formed surface plasmon  
13 resonance sensor; and  
14 an analyte detection chamber in fluidic communication with the  
15 surface plasmon resonance layer, adapted to generate a molecular  
16 interaction bias across the analyte detection chamber to direct  
17 bias responsive conjugated molecules to the surface plasmon  
18 resonance layer.



1 14. A method for kinetically controlled surface plasmon resonance  
2 analysis comprising:

3 providing a surface plasmon resonance sensor having a surface  
4 plasmon layer in optical communication with the sensor;

5 derivatizing the surface plasmon layer;

6 placing an analyte detection chamber in fluidic communication  
7 with the derivatized surface plasmon layer, wherein the chamber is  
8 adapted to generate a molecular interaction bias across the  
9 chamber;

10 providing a conjugate between an analyte and a bias responsive  
11 moiety, wherein the analyte is reactive with the derivatized  
12 surface plasmon layer and the bias responsive moiety changes the  
13 response of the analyte to the molecular interaction bias;

14 introducing the conjugated analyte into the chamber;

15 generating the molecular interaction bias; and

16 determining changes in surface plasmon resonance due to  
17 association of the conjugated analyte to the derivatized surface  
18 plasmon layer.

1 15. The method of claim 14 wherein the molecular interaction bias  
2 is electrical.

1 16. The method of claim 14 wherein the molecular interaction bias  
2 is magnetic.

1 17. A sample delivery and sensing apparatus adapted for performing  
2 the method of claim 15.

1 18. A sample delivery and sensing apparatus adapted for performing  
2 the method of claim 16.

1 19. The method of claim 14 wherein the conjugated analyte is  
2 adapted for the kinetically enhanced measurement of molecular  
3 interactions in the groups consisting of: avidin-biotin binding,  
4 antibody-antigen binding, antibody-antigen dissociation kinetics,  
5 protein binding, protein-nucleic acid binding, specific detection  
6 of small molecules, concentrations of analytes, measurement of  
7 oligonucleotide complements, mixture proportions, receptor-ligand  
8 interactions, aptamer interactions, and molecular assembly events.

1 20. The method of claim 19 wherein the conjugated analyte is  
2 adapted for the kinetically enhanced measurement of molecular  
3 interactions in competitive binding assays.